Diabetes Prevention in Community Pharmacy

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Declaration of Potential Conflicts of Interest

The speakers have no financial conflicts of interest to report in relation to this program.

Learning Objectives

1. Explain the design, results, and ongoing outcomes of the diabetes prevention program (DPP) trial and its impact on practice and patient care.
2. Discuss diabetes prevention strategies, such as the Group Lifestyle Balance Program, that can be used in the community pharmacy setting.
3. Relate methods for involving pharmacy students in offering a sustainable diabetes prevention program in your pharmacy.
Overview

• Review the evidence in support diabetes prevention efforts
  – Discuss results and ongoing work of DPP trial
• Demonstrate methods pharmacists can use to help patients prevent diabetes
  – Practice calorie and carb counting
• Introduce programs community pharmacists can offer for diabetes prevention
  – Discuss ways pharmacy students can help you

Part 1: Diabetes Prevention Program (DPP)

Brenda Montgomery, RN, MSHS, CDE
Diabetes Research Group
More detail?

The Diabetes Prevention Program
DPP Goals

Primary
• To prevent or delay the development of type 2 diabetes in persons with impaired glucose tolerance (IGT)

Secondary
• Reduce CVD events
• Reduce CVD risk factors
• Reduce atherosclerosis

Eligibility Criteria
• Age ≥ 25 years
• Plasma glucose
  – 2 hour glucose 140-199 mg/dl (7.8-<11.1 mmol/L) and
  – Fasting glucose 95-125 mg/dl (5.3- <7.0 mmol/L)
• Body mass index ≥ 24 kg/m²
• All ethnic groups
  – Goal of up to 50% from high risk populations

Diabetes Prevention Program Clinics

http://www.bsc.gwu.edu/dpp/slides.htmlvdoc
Study Cohort

- Caucasian 55%
- African American 19%
- Hispanic American 16%
- Asian American 19%
- American Indian 4%

The DPP Research Group, NEJM 346:393-403, 2002

Study Design

Eligible participants
- Randomized
- Standard lifestyle recommendations
  - Intensive Lifestyle (n = 1079)
  - Metformin (n = 1073)
  - Placebo (n = 1082)

http://www.bsc.gwu.edu/dpp/slides.html#doc

DPP Participants

Adults at high risk for type 2 diabetes
- Presence of IGT
- Mean age 51 years
- Mean body mass index (BMI) 34
- 68% women
- 45% minority groups
  - African Americans
  - Hispanic and Latino Americans
  - American Indians
  - Asian Americans and Pacific Islanders

DPP Interventions

**Lifestyle:** A comprehensive program with the following specific aims:
- Reduction of fat and calorie intake
- Physical activity at least 150 minutes/week
- > 7% loss of body weight and maintenance of weight loss

**Metformin:**
- Approved for use in type 2 diabetes
- Dose gradually increased as tolerated

DPP Methods

**DPP Curriculum:**
- Diet
- Exercise
- Behavior change modification

*Taught one-on-one by case managers*


Key Features of the DPP Lifestyle Balance Intervention

- Goal based
- Standardized core curriculum sequence
- Individual case managers or coaches
- Less frequent, but regular contact following initial curriculum delivery
A good dose of lifestyle treatment has a fundamental delivery sequence

- **1-8**: Self-management of diet, physical activity, weight, environment
- **9-16**: Psychological and behavioral skills for ongoing problem solving and application

**Key DPP Post Core Strategies**

- In person contact at least every two months—but more often if desired
- Interim phone or mail contact
- Supplemental group classes
- Motivational campaigns, boosters, restarts

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**Incidence of Diabetes**

<table>
<thead>
<tr>
<th>Years from randomization</th>
<th>Cumulative incidence (%)</th>
</tr>
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<tbody>
<tr>
<td>0</td>
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<tr>
<td>1</td>
<td>10</td>
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<tr>
<td>2</td>
<td>20</td>
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<tr>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
</tr>
</tbody>
</table>

**Risk reduction**

- 31% by metformin
- 58% by lifestyle

The DPP Research Group, *NEJM* 346:393-403, 2002
Mean Weight Change

The DPP Research Group, NEJM 346:393-403, 2002

Change in calorie intake

Change in percent of calories from fat

The DPP Research Group, NEJM 346:393-403, 2002
DPP Lifestyle Weight Change
(results after 16 core sessions)

24 weeks (median time to complete):
Mean weight loss:
6.5 kg
49% had lost 7% or more

Wing et al., Obes Res 12: 1426-1434, 2004

DPP Lifestyle Weight Change
(at final follow up visit)

Over course of study (average 3.2 years)
Mean weight loss:
4.5 kg
37% maintained loss of 7%
or more

Wing et al., Obes Res 12: 1426-1434, 2004

Weight loss dominant determinant
of reduced diabetes risk

- Each kilogram of weight loss associated with 16% reduction in diabetes risk
- Lower percent calories from fat predicted weight loss
- Increased physical activity predicted weight loss more strongly over time

Hamman et al., Diab Care 29: 2102–2107, 2006
Older age strongly associated with weight loss (and adherence)

- Older age strongly predictor of success in meeting 7% weight loss goal at 24 weeks and 3.2 years
- By final visit, 63% of participants ≥60 yrs were at weight goal compared to 43% of those age 45-59 yrs
- Older participants turned in more self-monitoring booklets and reported lower percent calories from fat

DPP confirms diabetes prevention effects associated with central adiposity & BMI

- Intensive lifestyle group had highly significant reductions in visceral fat, significant decreases in subcutaneous fat, and central waist circumference (both sexes) as well as body weight and BMI
- Reduction of diabetes risk with metformin was independent of changes in body size or central adiposity and the effect size was smaller

Fujimoto WJ et al., Diabetes, 56:1680-1685, 2007

Keys to DPP Lifestyle Success

- Weight loss was the key to diabetes prevention
- Reduction of total calories, especially fat calories
- Achieving 150 minutes of activity each week
Conclusions

- Both interventions reduce the incidence of diabetes and thus reduced cardio-metabolic risk.
- Both interventions were well accepted and safe.
- Both interventions were effective in men and women and all ethnic groups.

Bridge Period from DPP to DPPOS

- Summer 2001 - Fall 2002
  All participants continued on DPP treatments
- January - June 2002
  All participants were offered a 16-session Group Lifestyle Balance Program
- September 2002
  Diabetes Prevention Program Outcomes Study began

The Diabetes Prevention Program Outcomes Study

Long-term Follow-up
A Legacy Effect?
DPP Outcomes Study (DPPOS)

• 3251 DPP participants joined DPPOS (88% of all original DPP groups)

• DPPOS Goals:
  • Diabetes delay or prevention
  • Prevention of diabetes complications such as kidney, eye and nerve problems, and heart disease

Diabetes Prevention Program Outcomes Study (DPPOS)

Preliminary results

• 8% of participants with pre-diabetes had diabetic eye disease

• 12% of participants who developed type 2 diabetes during the DPP had diabetic eye disease

Our DPPOS Goals

• Diabetes delay or prevention
  – Lifestyle: Aim for 7% weight loss and 150 minutes of physical activity per week
  – Medication: Study Metformin
**DPPOS Lifestyle Treatments**

- All treatment groups (Placebo, Metformin, and Lifestyle) offered:
  - HELP classes four times a year
  - Educational topics related to nutrition, activity, and motivation
  - Re-emphasize the 7% weight loss and 150 minute weekly activity goal

- Original Lifestyle group offered:
  - BOOST lifestyle campaigns twice a year
  - Four session classes, each spring and fall
  - Reinvigorate practice of behavior change skills (e.g., self-monitoring, goal setting, use of small rewards for achieving short term campaign goals)

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**DPPOS Incidence of Diabetes**

Graph showing cumulative incidence of diabetes across different treatment groups over time. The graph includes Placebo, Metformin, and Lifestyle categories.

**Incidence of Diabetes – 60+ yrs old**

Graph showing a comparison of incidence of diabetes among participants aged 60 years and older, categorized by Placebo, Metformin, and Lifestyle treatments.

Weight Change Over Time – Overall

DPP vs. DPPOS Diabetes Rates

Diabetes Frequency After 10 years

- 52% of Placebo participants have diabetes
- 47% of Metformin participants have diabetes
- 42% of Lifestyle participants have diabetes
Heart Disease Risk

- All treatment groups had decreased blood pressure, cholesterol and triglycerides.
- Lifestyle participants had the same or lower blood pressure and lipid levels over time than other participants with less use of medicines.

DPPOS Diabetes Risk Reduction

- Delay in diabetes onset after 10 yrs follow-up:
  - 4 years for Lifestyle
  - 2 years for Metformin
- The lower rate of diabetes development for lifestyle and metformin during DPP means:
  - Original Lifestyle participants have a 34% lower risk of diabetes compared to Placebo
  - Original Metformin participants have a 18% lower risk of diabetes compared to Placebo

Heart Disease Risk

- All treatment groups have shown decreases in blood pressure, cholesterol and triglycerides.
- Lifestyle participants had the same or lower blood pressure and lipid levels over time than other participants with less use of medicines.
Economics of Prevention

• Data on resource utilization, cost, and quality-of-life were collected prospectively during DPP and DPPOS.

• Economic analyses were performed from a health system perspective that considered direct medical costs.

Cumulative, Undiscounted, Per-participant Direct Medical Costs

<table>
<thead>
<tr>
<th>DPP/DPPOS Interventions</th>
<th>Medical Care Received Outside the DPP/DPPOS</th>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>Costs ($) by category</th>
<th>Lifestyle</th>
<th>Metformin</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatient visits</td>
<td>6,845</td>
<td>7,145</td>
<td>7,325</td>
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<tr>
<td>Inpatient care</td>
<td>5,631</td>
<td>5,817</td>
<td>6,856</td>
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<tr>
<td>ER visits</td>
<td>1,941</td>
<td>1,690</td>
<td>1,825</td>
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<td>Urgent care visits</td>
<td>1,697</td>
<td>1,945</td>
<td>1,811</td>
</tr>
<tr>
<td>Calls to physicians</td>
<td>712</td>
<td>742</td>
<td>712</td>
</tr>
<tr>
<td>Prescription medications</td>
<td>6,490</td>
<td>6,619</td>
<td>6,959</td>
</tr>
<tr>
<td>Self monitoring supplies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and laboratory tests*</td>
<td>1,248</td>
<td>1,628</td>
<td>1,978</td>
</tr>
<tr>
<td>TOTAL</td>
<td>24,563</td>
<td>25,615</td>
<td>27,468</td>
</tr>
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</table>

* diabetic participants only
Diabetes Prevention

Type 2 diabetes prevention is:
• PROVEN
• POSSIBLE, and
• POWERFUL

Part 2: Diabetes Prevention Methods for Pharmacists

Jennifer Danielson, PharmD, MBA, CDE
Clinical Assistant Professor

Peggy Odegard, PharmD, CDE
Department Chair and Professor
University of Washington School of Pharmacy

Washington Diabetes Stats

• ~606,000 Washingtonians have diabetes
  • Seattle population 2010: 608,660

• 67,000 hospitalizations each year in WA

• 4,000 deaths per year in Washington

Now: Fire up your laptop or smart phone!
http://www.doh.wa.gov/cfh/diabetes/default.htm
Detecting PreDiabetes

Time Course Toward DM

ADA Screening Guidelines

- Screen for Type 2 DM starting at 45 yo if:
  - Overweight (BMI>25-27) or obese (BMI>30)
  - 1 or more risk factors
- Retest every 3 years
- Appropriate tests:
  - A1c, FPG, or OGTT
Metabolic Syndrome

"According to AHA, 1 in 6 Americans have it."

Excess weight (central obesity)
Insulin resistance
Dyslipidemia

Altered glucose and fat metabolism
Proinflammatory state
Prothrombotic state

Increased risk of coronary artery disease, stroke, and diabetes

Metabolic Syndrome

Diagnosed when ≥ 3 of these risk factors are present

• Signs
  – FPG > 100 mg/dL
  – BP > 135/85 mmHg
  – Increased waist circumference
    • ≥ 40 inches in men
    • ≥ 35 inches in women
  – Low HDL
    • < 40 mg/dL in men
    • < 50 mg/dL in women
  – Triglycerides ≥ 150 mg/dL

Core Life Style Changes

Problem Solving and Motivation

Physical Activity
Healthy Eating
Calorie Balance

Macronutrients

<table>
<thead>
<tr>
<th>Calories per Gram</th>
<th>Fat</th>
<th>Carbohydrates (Starches/Sugars)</th>
<th>Protein</th>
<th>Alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9</td>
<td>4</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

What did you eat for dinner last night?

Dinner
- 1 Chicken breast (baked)
  - Wine sauce and mushrooms
- 1 baked potato (large)
  - Sour cream, grated cheese, and butter
- 1 cup steamed broccoli
- 1 glass (6 oz) wine
- 1 piece cheesecake
  - ¼ c. Strawberries
  - Large dollop heavy whipped cream
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**Calories**

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**Calories**
- 130
  - 126
- 260
  - 126
- 60
  - 100
- 24
  - 102
- 24
  - 120
- 200-400
  - 24
  - 100

Total = ~1300

Basal Metabolic Rate

**Women**: BMR = 655 + (4.35 x weight in pounds) + (4.7 x height in inches) - (4.7 x age in years)

**Men**: BMR = 66 + (6.23 x weight in pounds) + (12.7 x height in inches) - (6.8 x age in years)

*Key is to... consume 500 calories less per day than you use!*

1 pound per week = acceptable weight loss rate
(≥ 1200 calories per day minimum)

Carb Counting

**Recommended daily carbohydrate servings:**
- 15gm carb = 1 serving
- **Women**: 3-4 servings per meal
- **Men**: 4-5 servings per meal
- 1-2 servings per snack
The Power of a Food Label

Dinner
- 1 Chicken breast (baked) – Wine sauce and mushrooms
- 1 baked potato (large) – Sour cream, grated cheese, and butter
- 1 cup steamed broccoli
- 1 glass (6 oz) wine
- 1 piece cheesecake – ¼ c. Strawberries – Large dollop heavy whipped cream

Carbs
- 0 servings
- 4 servings
- 0 servings
- ~ ½ serving
- 1 serving

Total = 6 ½ servings
Be a Fat Detective

Dinner
- 1 Chicken breast (baked)
  - Wine sauce and mushrooms
- 1 baked potato (large)
  - Sour cream, grated cheese, and butter
- 1 cup steamed broccoli
- 1 glass (6 oz) wine
- 1 piece cheesecake
  - ¼ c. Strawberries
  - Large dollop heavy whipped cream

Fat

FAT!

Be a Fat Detective

Dinner
- 1 Chicken breast (baked) ★

Hierchoy of Fats
Poly-unsaturated
(Omega-3s: flaxseed, fish)
Mono-unsaturated
(olive and canola oil, nuts, avocado)
Saturated
(animal fat, cheese, butter)

Part 3:
Implementing Diabetes Prevention in Your Pharmacy

Lisa Woodard, PharmD, MPH
Clinical Associate Professor

Washington State University College of Pharmacy
Group Lifestyle Balance™ (GLB) Program

**Schedule**
- 3 months
  - Weekly meetings
- 3 months
  - Weekly or bi-monthly
- 6 months
  - Monthly meetings

**Topics**
- Healthy Eating
- Calories and Fat
- Physical Activity
- Problem Solving
- Staying Motivated
- Stress and Time Management

Pharmacists as Health Educators

- Highly accessible
- Trained in health promotion and disease prevention
- Demonstrated impact in chronic disease management and prevention

Diabetes Prevention in Pharmacies

**Specific Aims**
- To reduce the prevalence of diabetes in communities in Washington State by offering the Group Lifestyle Balance™ at community pharmacies
### Diabetes Prevention in Pharmacies

**Specific Aims**

- To demonstrate the efficacy and feasibility of offering the Group Lifestyle Balance™ program at community pharmacies.

### Student Pharmacist Preparation

**Fall Elective Course**

- Participants in the Group Lifestyle Balance™ curriculum
- Instruction in teaching/group management
- Practice teaching sessions
- Screening participants for winter GLB course

**Winter Elective Course**

- Deliver GLB curriculum to client group
Student Pharmacist Participation

Summer/Fall APPE Students

- Recruit clients for GLB course
- Implement GLB curriculum in community pharmacies

Participating Pharmacists

- Training in GLB curriculum and delivery
- Equipment and supplies for course
- Trained APPE students to deliver course

DPP Lifestyle Resource Core, University of Pittsburgh Medical Center

Outcome Goal

- Translate the Group Lifestyle Balance™ intervention to community-based pharmacies in a sustainable model
Thank you!

Questions?